UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

STATEMENT OF BASIS

U.S. EPA UNDERGROUND INJECTION CONTROL (UIC)
DRAFT CLASS II-D PERMIT PAS2R420BMCK

FOR

SANDSTONE DEVELOPMENT LLC
557 INTERSTATE PARKWAY
BRADFORD, PENNSYLVANIA 16701

FOR

A project consisting of one Class II-R enhanced recovery injection well, which allows injection of produced fluid to enhance recovery of oil, located at:

Moody Lot 5
in Bradford Township
McKean County, Pennsylvania

On March 15, 2021, Sandstone Development LLC ("Sandstone" or "the Permittee") submitted a UIC permit application to the U.S. Environmental Protection Agency ("EPA" or the "Agency"), Region 3, for the issuance of a permit that would allow for the conversion and operation of a Class II-R enhanced recovery injection well, Moody Lot 5 #17, API # 37-083-53736, (hereinafter, "Injection Well", "Moody Lot 5 #17", or the "Facility"), located in the Moody Lot 5, in Bradford Township of McKean County, Pennsylvania. The coordinates for the Injection Well are: Latitude 41° 54' 34.38" Longitude -78° 35' 15.70". The application was officially deemed complete on April 20, 2021. The Permittee's March 15, 2021 submittal is hereinafter referred to in this Statement of Basis as the "Permit Application".

Pursuant to the federal Safe Drinking Water Act, 42 U.S.C. §§ 300f *et. seq.*, and its implementing regulations, 40 C.F.R. §§ 144 -146, and 40 C.F.R. §§ 147.2350 - 2352, the EPA has developed a federal UIC Program and, through the issuance of permits, is responsible for regulating the construction, operation, monitoring and closure of injection wells that place fluids underground for disposal or enhanced recovery in oil and gas production. Today's draft permit specifies conditions for Injection Well construction, operation, monitoring, reporting, and plugging and abandonment which are designed to protect and prevent the movement of fluids into Underground Sources of Drinking Water ("USDW"). The Permittee's UIC project and the draft permit conditions specific to the project are described below:

Area of Review: Pursuant to the applicable regulations, 40 C.F.R. §§ 144.3 and 146.6(b), the "Area of Review" is an area surrounding the Injection Well for which the applicant must first research, and then develop, a program for corrective action to address any wells that penetrate the injection zone and which may provide conduits for fluid migration during the injection operation at the Facility. Sandstone proposed a fixed radius Area of Review of one-quarter mile, which EPA has determined to be acceptable. In determining the fixed radius, EPA has considered the following information provided by the Permittee: chemistry of injected and formation fluids; hydrogeology, population and ground-water use and dependence; and historical practices in the area. Sandstone has provided documentation identifying and describing the fluid to be injected, the ground-water use in the area, and on the well population within the one-quarter mile Area of Review. The injection formations are oil and gas bearing zones and therefore compatible with the injectate given that the fluids to be injected are byproducts of oil and gas production. There are no drinking water wells within a half mile radius of the Injection Well. The Permittee has reported the presence of six (6) natural springs within the mile and one quarter (1 ¼ mile) radius but confirms that none of those springs are used as a drinking water source within the Area of Review. The Permittee also indicated that there are twenty (20) active production wells within the Area of Review, including the proposed injection well Moody Lot 5 #17. There are no plugged wells, and no known unplugged/abandoned wells, within the Area of Review. If any unplugged/abandoned wells that penetrate the injection zone are found within the Area of Review at a later date, the draft permit requires the Permittee to perform corrective action.

Underground Sources of Drinking Water (USDW): An USDW is defined by the UIC regulations as an aquifer or its portion which, among other things, contains a sufficient quantity of ground water to supply a public water system and which also contains fewer than 10,000 mg/L (milligrams per liter) Total Dissolved Solids, and which is also not an exempted aquifer. The Permittee notes that the deepest USDW zone reported by the driller of the proposed Injection Well is at approximately 300 feet deep. Therefore, EPA has determined that the lowermost USDW is located at 360 feet below ground surface. Construction of the Injection Well requires the Permittee to install surface casing to a depth of approximately 502 feet and to cement that entire length of casing back to the surface. The Permittee must, among other requirements, also install long string casing from the ground surface to an approximate depth of 1,860 feet and cement that intermediate casing back to the surface. The Permittee must install in the Injection Well, and inject fluids through, a tubing string which is set on a packer and placed above the injection zone interval at approximately 1,855 feet below ground surface. Both the surface casing and the intermediate casing are required to protect ground-water.

Injection and Confining Zones: Injection of fluids for enhanced recovery is limited by the draft permit to the Bradford Third sandstone formation in the subsurface interval between approximately 1,863 feet to 1,963 feet below ground surface.

The Bradford Third sandstone runs from approximately 1,800 feet below ground surface to 1,900 feet below ground surface based on elevation differences. The lowermost USDW is separated from the injection zone by approximately 1,503 feet. Directly above the Bradford Third formation is 25 feet of unnamed shale that will act as a confining unit for the injection zone. Additionally, between the lowermost USDW and the injection zone are multiple layers of shale ranging from 20 feet to 755 feet in thickness which will also act as confining units for the injection zone.

Injection Fluid: The draft permit limits the injection fluids in this well to produced fluids obtained solely from Sandstone's conventional production operations. The draft permit also establishes a maximum daily injection volume of 40 barrels per day. One barrel of fluid is equal to 42 gallons.

The Permit Application includes analyses of the injection fluid that corresponds to the requirements stated in Paragraph II.C.3. in the draft permit. The parameters chosen for sampling reflect not only some of the typical constituents found in the injection fluid, but also in shallow ground water. Should a ground water contamination event occur during the operation of the Injection Well, EPA will be able to compare samples collected from groundwater with the injection fluid analysis to help determine whether operation of the Injection Well may be the cause of the contamination.

Maximum Injection Pressure: The maximum allowable surface injection pressure for the permitted operation of the Injection Well will be 1,235 pounds/square inch ("psi") with a bottom-hole pressure of 2,106 psi. The maximum surface injection pressure and bottom-hole pressure were developed using the injection pressure limitation calculation; a formula that considers the depth to the top of the Bradford Third sandstone injection zone, the specific gravity of the injected fluid (1.08) and a fracture gradient developed by using the instantaneous shut-in pressure (a pressure lower than the fracture pressure).

Potential for Seismicity: The SDWA regulations for Class II injection wells do not require consideration of the seismicity of the region, unlike the SDWA regulations for Class I injection wells for the injection of hazardous wastes. See regulations for Class I hazardous injection wells at 40 C.F.R. §§ 146.62(b)(1) and 146.68(f). Nonetheless, because of public concerns about injection-induced seismicity, EPA evaluated factors relevant to seismic activity as discussed below and addressed more fully in [HYPERLINK "https://yosemite.epa.gov/oa/eab_web_docket.nsf/Attachments%20By%20ParentFilingId/0EA8C0D9BA82F48B85257CD9006624C2/$FILE/Tab%20I%20seismicity%20framework9-26-13.pdf"]. The final permit will provide that the Permittee shall only inject produced fluids through the Injection Well and into a formation which is overlain by a confining zone free of known open faults or fractures within the Area of Review, as required pursuant to 40 C.F.R. § 146.22.

A report conducted by the *Commonwealth of Pennsylvania Department of Conservation and Natural Resources Bureau of Topographic and Geologic Survey*, [HYPERLINK "http://elibrary.dcnr.pa.gov/GetDocument?docId=1752494&DocName=ES10_EQHazard_Pa.pdf"] documents known epicenters found in Pennsylvania. Per the report, there are no documented cases in which the epicenter of an earthquake was traced back to McKean County, Pennsylvania. On page 7 of the report, the author states, "The great majority of earthquakes occur along boundaries between tectonic plates. The reason for this is not completely clear, but it appears that stress levels are higher along plate boundaries, and that strain energy builds up more rapidly in those areas. Eastern North America, including Pennsylvania, today is far from the nearest plate boundary – the mid-Atlantic Ridge, some 2,000 miles to the East."

The United States Geological Survey as well as the Pennsylvania Bureau of Topographic and Geologic Survey have not recorded and EPA has not been notified of any seismic activity that originated in McKean County, Pennsylvania. Sandstone's injection activity is for the purpose of enhanced recovery which has a low potential to induce seismicity due to the total change in formation pressure as the injection fluid replaces the volume of oil and gas extracted. The final permit will include an injection pressure limit, the surface Maximum Allowable Injection Pressure ("MAIP"), to prevent the initiation or propagation of fractures that could create conduits for the injected fluid to flow to any existing faults.

The MAIP is set at a level less than both the Instantaneous Shut-In Pressure, which is the wellhead pressure immediately after pumps are shut down following a fracture treatment or test, and the fracture pressure in order to prevent the initiation of new, or the propagation of existing, fractures as a result of injection activities. The formula used to calculate the surface MAIP can be found in Paragraph III.B.4. of the draft permit.

Testing, Monitoring and Reporting Requirements: The Permittee is required to conduct a mechanical integrity test ("MIT") after conversion of the Injection Well. The MIT consists of a pressure test and a fluid movement test. The pressure test will be conducted in order to ensure that the casing, tubing and packer in the Injection Well do not leak. The fluid movement test, which includes case cement record and cement bond log or temperature log reviews, will be conducted to ensure that fluid movement does not occur outside of the injection zone. In addition to the testing described above, additional pressure testing of the casing, tubing and packer will occur every five (5) years and whenever a rework on the Injection Well requires the tubing and packer to be released and reset.

The Permittee will be responsible for continuously monitoring the Injection Well for surface injection pressure, annular pressure, flow rate and cumulative volume from the date on which the Injection Well commences operation and until such date that the Injection Well is plugged and abandoned. The Injection Well shall be equipped with automatic shut-off devices which would be activated in the event of a mechanical integrity failure. In addition, Paragraph II.D.3 requires the Permittee to report to the Director, within twenty-four (24) hours, any Permit noncompliance which may endanger, or which has endangered, human health or the environment. The Permittee must submit an Annual Report to the EPA summarizing the results of the monitoring and testing activities required by the permit, including monthly monitoring records of the injection fluid, the results of any mechanical integrity testing and information identifying any major changes in the characteristics of the injected fluid. The Annual Report must be submitted to EPA by January 31 of each calendar year.

Plugging and Abandonment: The Permittee has submitted a Plugging and Abandonment Plan that will result in an environmentally protective Injection Well closure at the time of cessation of operations. The Permittee will secure a Standby Trust Agreement to ensure proper plugging of the Injection Well. The amount of the Standby Trust Agreement shall cover the estimated cost to close, plug and abandon the Injection Well and shall be in the amount of at least $5,500.00. The amount of the Standby Trust Agreement, which is based upon an independent, third-party professional's estimate of the costs associated with the plugging and abandonment of the Injection Well, must also be sufficient to preclude the possibility of abandonment without proper plugging and closure. Authorization to construct and operate the Injection Well will not be given by EPA until financial assurance is in place.

Expiration Date: When issued, a final permit will be in effect for the operational life of the Facility, which includes the proper plugging and abandonment of the Injection Well when operations cease. EPA will conduct an annual review of the Permittee's Injection Well operation. The final permit will contain the same conditions as in this draft permit unless EPA receives information supporting and warranting alternative final permit conditions or actions on this Permit Application.

Additional Information: The Administrative Record for the draft permit is available for public inspection. All information submitted by the Permittee in support of the draft permit, unless deemed confidential, is included in the Administrative Record for the draft permit and is available to the public for review. Copies of the Permit Application, the draft permit, the Statement of Basis, and the Administrative Record index are available for review and inspection on EPA's [HYPERLINK

"https://www.epa.gov/pa/epa-public-notices-pennsylvania"]. Please direct any questions, comments and requests for additional information to the contact listed below. **The Administrative Record for this action will remain open for public comment until XXXXXX XX, 2021**.

Tentative Public Hearing: EPA has tentatively scheduled a virtual public hearing on XXXX XX, 2021. An in-person hearing will not take place. The call-in information for the teleconference is listed below:

Call-in Number: (XXX) XXX-XXXX 6:00 PM – 8:00 PM Eastern Standard Time

There is no need to register in advance for the virtual hearing. You may call 15 minutes in advance of the start time or any time during the session to listen to the hearing. During the hearing, callers will receive instructions on how to join the queue to make a comment. The operator will call on people to deliver their oral comments. The virtual hearing is an audio-only teleconference. Participants who want to supply written or printed materials, should do so via email.

Requests to hold this public hearing must be received via email or telephone by EPA by XXXX XX, 2021. When requesting a public hearing, please state the nature of the issues you propose to raise. EPA expressly reserves the right to cancel this hearing unless a significant degree of public interest is evidenced by XXXX XX, 2021.

Submit comments or requests for a hearing or for additional information to:

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